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SPECIFICATION FOR EMERGENCY LIGHTING UNITS

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Indian Standard

SPECIFICATION FOR EMERGENCY LIGHTING UNITS

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Indian Standard
SPECIFICATION FOR EMERGENCY LIGHTING UNITS

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 23 January 1981, after the draft finalized by the Illuminating Engineering Sectional Committee had been approved by the Electrotechnical Division Council.

0.2 Emergency lighting units are now-a-days widely used to provide lighting in emergency for the specified duration so that the failure of normal supply does not cause a total extinction of lights and allows the normal activities to continue or to be terminated safely. An automatic switching system is invariably provided to switch on/off the emergency lighting units in the case of failure/restoration of normal supply.

0.3 This standard also gives information (*see* Appendix A) regarding types of batteries suitable for emergency lighting units, gives a description of battery types, draws attention to the matter of a battery's effective capacity loss during its life, and indicates those types of batteries considered unsuitable for mounting.

0.4 For the reliable operation of the emergency lighting units, it is essential that the supplier's instructions for operation and maintenance of emergency lighting units and batteries (*see also* Appendix B) are followed properly.

0.5 In the preparation of this standard assistance has been derived from the following:

IEC : 598-2-22(1980) Luminaires: Part 2 Particular requirements: Section Twenty Two Luminaires for emergency lighting, issued by International Electrotechnical Commission.

NF C 71-800 : 1977 Requirements for emergency incandescent lighting units, issued by French National Standards Association (AFNOR).

NF C 71-801 : 1977 Requirements for emergency fluorescent lighting units, issued by French National Standards Association (AFNOR).

0.6 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard covers the requirements and methods of tests for emergency lighting units fitted with incandescent, fluorescent lamps and other discharge lamps.

1.2 The emergency lighting units covered in this standard are suitable for providing the emergency lighting between 1 to 3 hours duration and employ automatic switching on/off devices in the event of failure/ restoration of normal power supply.

2. TERMINOLOGY

2.0 For the purpose of this standard the following definitions shall apply.

2.1 Emergency Lighting Unit — An emergency lighting apparatus using electric lamps, accumulators, charging and other devices for operating it in the case of need.

2.2 State of Readiness of an Emergency Unit — State in which an emergency unit is ready to operate if there is a failure in the normal power supply.

2.3 State of Functioning of an Emergency Unit — State in which an emergency unit gives light by electricity fed from its internal emergency source.

2.4 Standby Lighting — That part of emergency lighting which may be provided to enable normal activities to continue or be terminated safely (may be at a lower illuminance).

2.5 Maintained Emergency Luminaire — A luminaire in which the emergency lighting lamps are energized at all times when normal or emergency lighting is required.

2.6 Non-maintained Emergency Luminaire — A luminaire in which the emergency lighting lamps are in operation when the supply to the normal lighting fails.

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*Rules for rounding off numerical values (*revised*).

2.7 Combined Emergency Luminaire — An emergency lighting luminaire containing two or more lamps, at least one of which is energized from the emergency lighting supply and the other(s) from the normal lighting supply. A combined luminaire may be either maintained or non-maintained.

2.8 Self-Contained Emergency Luminaire — A luminaire providing maintained or non-maintained emergency lighting in which all the elements, such as the battery, the lamp, the control unit and the test and monitoring facilities, where provided, are contained within the luminaire or adjacent to it (that is within 500 mm).

2.9 Centrally Supplied Luminaire — A luminaire intended for maintained or non-maintained operation and which is energized from a central emergency power system.

2.10 Control Unit — A unit or units comprising a supply changeover system, a battery charging device and, where appropriate, means for testing. For tubular fluorescent lamp luminaires an inverter and lamp ballast can also be included in the unit.

2.11 Normal Supply Failure Condition — That condition when the normal lighting can no longer provide a minimum illuminance for emergency escape purposes and when the emergency lighting must become operative.

3. GENERAL REQUIREMENTS AND CONSTRUCTION

3.1 General Description

3.1.1 The emergency lighting unit consists essentially of the following:

a) Incandescent, fluorescent or other discharge lamps for illuminating the premises.
b) Rechargeable type of accumulators for supplying electricity to these lamps.
c) Switching devices for transiting from the state of readiness to the functioning and *vice versa* in the case of failure/restoration of the normal power supply.

3.2 Construction

3.2.1 All emergency lighting luminaires, except those centrally supplied shall incorporate an indicator, for example, a lamp, which shows that:

a) The normal supply is connected;
b) The battery is being charged; and
c) Circuit continuity exists through the tungsten filament, where appropriate.

3.2.2 In combined emergency luminaires with central emergency power supply, adequate separation between normal and emergency supplies shall be ensured by double insulation, reinforced insulation, earthed screen or other equivalent means.

3.2.3 Self-contained emergency luminaires shall incorporate batteries which are rated for at least four years of normal operation.

NOTE — Replacement of batteries is necessary when the luminaire, no longer meets its declared duration performance.

3.2.4 The luminaire shall provide rated lumen output within 5 seconds after being switched on.

3.2.5 There shall be no switches incorporated in the emergency circuits.

3.2.6 A fuse shall be provided for protection in the input circuit.

3.3 Lamps

3.3.1 The emergency illumination in an emergency unit shall be assured by the sufficient number of lamps.

3.3.2 The rated wattage of the lamps shall match the capacity of the accumulators.

3.4 Internal Source of Electrical Energy

3.4.1 Suitable rechargeable type of secondary batteries capable of providing the lighting for a duration of between 1 to 3 hours as declared by the manufacturer shall be used. (The preferred values of duration are 1 hour and 3 hours.)

3.4.2 The battery/charger combination shall be so designed that, after the battery has been discharged for the specified duration, it shall be capable of again supporting the specified duration period following a recharge period of not more than 24 hours. The manufacturer shall declare the maximum period the batteries are capable of giving light output in the state of functioning without end voltage falling below the voltage values specified in **3.4.2.1** and shall also declare rate of recharging and the maximum duration required for the same.

3.4.2.1 For the purpose of **3.4.2** complete battery discharge for 1 hour and 3 hours duration is indicated below:

Battery Type	*For Complete Discharge in 1 Hour V/Cell*	*For Complete Discharge in 3 Hours V/Cell*
Nickel cadmium	1·0	1·0
Lead acid	1·75	1·80

3.4.2.2 It should be possible to meet these requirements without exceeding the maximum designed charging characteristics of the battery in use. A general guidance regarding the type of batteries suitable for emergency lighting units is given in Appendix A.

3.4.3 In the case of self-contained luminaire containing batteries inside the luminaire, suitable provision shall be made for the exhaust of fumes from the batteries.

3.4.4 After the battery has been fully charged, automatic switching to trickle charge shall be provided in the emergency lighting unit.

4. INTERNAL WIRING

4.1 The provision of **6** of IS : 1913 (Part I)-1978* shall apply.

5. PROVISION OF EARTHING

5.1 The provisions of **4.16** of IS : 1913 (Part I)-1978* shall apply.

6. TERMINALS FOR SUPPLY CONNECTION AND OTHER EXTERNAL WIRING

6.1 The provisions of **5** of IS : 1913 (Part I)-1978* shall apply.

7. CREEPAGE DISTANCES AND CLEARANCES

7.1 The provisions of **9** of IS : 1913 (Part I)-1978* shall apply.

8. MARKING

8.1 The emergency lighting units shall be marked legibly and durably giving the following information:

a) Name of the manufacturer or his trade-mark;

b) Luminaires shall be clearly marked with details of lamp and, where appropriate, battery replacement. The information relating to correct lamp replacement shall include the type, rated voltage and rated wattage. The information relating to correct battery replacement shall include the type, rated voltage and prospective life (that is, the period during which a luminaire/battery combination will give the manufacturer's claimed performance);

c) Duration of operation of the emergency units in hours; and

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*General and safety requirements for luminaires: Part I Tubular fluorescent lamps (*second revision*).

d) Terminals for connection:

+ for positive pole, — for the negative pole

~ for the connection to an ac source

⏚ earthing terminals.

8.1.1 The emergency units may also be marked with the Standard Mark.

NOTE — The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act, 1986 and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

9. TESTS

9.1 Type Tests

9.1.1 The following shall constitute the type tests:

a) Visual examination (*see* **9.2**);

b) Checking for proper functioning of switches (*see* **9.3**);

c) Operating test (*see* **9.4**);

d) Insulation resistance (dry) test [*see* **11.2** of IS : 1913 (Part I)-1978*];

e) High voltage test [*see* **11.3** of IS : 1913 (Part I)-1978*];

f) Test for protection against electric shock [*see* **11.9** of IS : 1913 (Part I)-1978*]; and

g) Endurance test (*see* **9.5**).

9.1.1.1 For carrying out the type tests the manufacturer shall submit two complete emergency units which shall be subjected to the tests specified in **9.1.1** in the sequence given therein. If the failure occurs in one or more tests, the testing authority, at its discretion, may call for fresh samples not exceeding twice the original numbers and repeat all the tests. The type shall be considered to conforming to this standard if no failure occurs in the repeat test.

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*General and safety requirements for luminaires: Part I Tubular fluorescent lamps (*second revision*).

9.1.2 *Acceptance Tests*

9.1.2.1 The following shall constitute the acceptance tests:

a) Visual examination (*see* **9.2**);
b) Checking for proper functioning of switches (*see* **9.3**);
c) Operating test (*see* **9.4**);
d) Insulation resistance (dry) test [*see* **11.2** of IS : 1913 (Part I)-1978*];
e) High voltage test [*see* **11.3** of IS : 1913 (Part I)-1978*]; and
f) Test for protection against electric shock [*see* **11.9** of IS : 1913 (Part I)-1978*].

9.1.2.2 The sampling procedure and criteria for acceptance shall be subject to agreement between the supplier and the purchaser.

9.1.3 *Routine Test* — The following shall constitute the routine tests:

a) Visual examination (*see* **9.2**);
b) Checking for the proper functioning of the switches (*see* **9.3**);
c) Insulation resistance (dry) test [*see* **11.2** of IS : 1913 (Part I) 1978*]; and
d) High voltage test [*see* **11.3** of IS : 1913 (Part I)-1978*].

9.2 Visual Examination — The emergency lighting unit shall not have any visible sign of damage. Compliance is also checked by visual examination for the requirements given in **3** and **8**.

9.3 Checking for the Proper Functioning of the Switches — The emergency lighting unit shall be charged for the period as specified and shall then be tested for the proper functioning of the switching devices by carrying out 100 cycles of operation, each cycle consisting of putting the unit in the state of functioning and then bringing it back to the state of readiness.

9.3.1 For carrying out the acceptance and routine tests on emergency lighting unit, the number of cycles of operation shall be limited to 10 only.

9.4 Operating Test

9.4.1 The emergency lighting unit shall be charged for the period as specified and shall then be put on in the state of functioning for the period as specified at the normal load. At the end of this operation the voltage across the battery shall not fall below the value given in **3.4.2.1**.

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*General and safety requirements for luminaires: Part I Tubular fluorescent lamps (*second revision*).

9.4.2 A emergency lighting unit which has successfully passed the test mentioned above shall be tested for the loss of capacity on open circuit. For carrying out this test the emergency lighting unit shall be fully charged for the period as specified and shall then be disconnected from the supply and kept on open circuit for 28 days without any operation. At the end of 28 days the emergency lighting unit shall be put on in the state of functioning at the normal load. The time duration to reach the end voltage to the value shown in **3.4.2.1** shall not be less than the 80 percent of the declared time period.

NOTE — For carrying out the acceptance test on the emergency lighting unit test given in **9.4.1** shall only be carried out.

9.5 Endurance Test — The emergency lighting unit shall be tested for 100 cycles of operation, each cycle consisting of fully charging and then discharging the unit under normal load for the specified periods. At the end of 100 cycles of operation, emergency lighting unit shall be able to pass sucessfully the operating test given in **9.4.1**.

10. CONDITIONS OF SUPPLY

10.1 To facilitate the correct operation and maintenance of the emergency lighting units it is recommended that the supplier should furnish the particulars as given in Appendix B.

APPENDIX A

(*Clauses* 0.3 *and* 3.4.2.2)

BATTERIES SUITABLE FOR EMERGENCY LIGHTING UNITS

A-1. Batteries used in emergency lighting luminaires can be one of the following:

a) Sealed nickel cadmium batteries;
b) Sealed lead acid batteries;
c) Vented nickel cadmium batteries; and
d) Vented lead acid batteries.

A-2. BATTERY TYPES

A-2.1 Sealed Battery — A battery constructed without provision for the replacement of the products of electrolysis. A pressure exhaust vent may be included.

A-2.2 Vented Battery — A battery constructed with provision for the replacement of the products of electrolysis.

A-3. All batteries suffer a loss of effective capacity during their life, some more rapidly than others. The minimum interval for replacement of batteries specified in **3.2.3** is 4 years. To comply with this requirement, a battery with excess initial capacity should be chosen so that the luminaire will achieve its duration as marked, up to the time of battery replacement. The amount of excess initial capacity required depends on the type of battery chosen.

A-4. Where a luminaire can be mounted in any attitude, care must be taken in the choice of battery. All vented batteries and some types of sealed lead acid batteries are unsuitable for this type of application.

A-5. In the case of vented batteries it is important that batteries are used which are designed specifically for standby applications. Such batteries have different characteristics from other types of batteries and when designed for the purpose should have a minimum replacement period of 10 years.

APPENDIX B

(*Clauses* 0.4 *and* 10.1)

INFORMATION TO BE FURNISHED BY THE SUPPLIER

The supplier shall furnish the following details with each emergency lighting unit:

a) Type and number of cells per battery, layout of batteries, etc;

b) Capacity of the battery;

c) Type and number of lamps used; and

d) Instructions for operation and maintenance of the emergency lighting units and the batteries.

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